

(19)



(11)

EP 1 725 707 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
14.11.2007 Bulletin 2007/46

(21) Application number: **05709023.5**

(22) Date of filing: **16.03.2005**

(51) Int Cl.:
D06F 58/22 ^(2006.01)

(86) International application number:
PCT/IB2005/050919

(87) International publication number:
WO 2005/090669 (29.09.2005 Gazette 2005/39)

(54) **A WASHER / DRYER**

WASCHTROCKNER

LAVE-LINGE S CHANT

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR**

(30) Priority: **16.03.2004 TR 200400520**
24.12.2004 TR 200403612

(43) Date of publication of application:
29.11.2006 Bulletin 2006/48

(73) Proprietor: **Arçelik A.S.**
81719 Istanbul (TR)

(72) Inventors:
• **OZTURK, Umud, E.**
AR-GE Dept.
34950 Istanbul (TR)
• **WEBER, Ewald**
AR-GE Dept.
34950 Istanbul (TR)
• **TUNCEL Tunc**
AR-GE Dept.
34950 Istanbul (TR)

(56) References cited:
EP-A- 1 022 373 **US-A- 3 378 934**
US-A- 4 653 200 **US-A- 5 651 188**

EP 1 725 707 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] This invention relates to a washer / dryer comprising a filter group that traps the fiber, lint, fluff and the like in the drying air.

[0002] In dryers, the air that is heated by means of various methods is directed to the interior of the drum where the items to be dried are placed and then is sucked so as to return to the heating cycle. During the mentioned cycle of the air, it is necessary to trap the fiber, lint, fluff and the like. Therefore, various filters are developed to trap those particles. The afore-mentioned filters which are produced by utilizing different kind of materials are placed inside the dryer, at the circulation path of the air.

[0003] The said filters function by trapping the particles in the medium during the operation of the dryer. However in time, the mentioned particles in the medium accumulate on the filter located at the circulation path of the air, and these particles set an obstacle blocking the air circulation. Consequently, this blockage causes the energy consumption of the dryer to increase and the drying efficiency to decrease. For that reason, the mentioned filters should be cleaned by the user periodically.

[0004] In the current state of the art, in the United States Patent Document US 3748746, the filter group placed vertically at the side wall of the dryer is made to rotate about an axis by the user and, as a result of this rotation, the filter group moves upward and to the front and the filter located at the end of the filter group can be detached from its location by the user.

[0005] In the British Patent Document GB 2091123, yet another embodiment in the current state of the art, a description is given of a filter group comprising two arms which are connected to each other by a hinge and where-in filters are placed at the surfaces of the mentioned arms.

[0006] In the current state of the art, in the United States Patent Document US 5651188, the filter group is mounted to a lid positioned on the top panel of the dryer. If necessary, the user may open the mentioned lid and take out the filter material that is attached to the lower surface of the lid.

[0007] In another embodiment of the current state of the art, in the European Patent Document EP 1022373, a description is given of a filter group which may be taken out of the dryer by the user and, which comprises a filter placed onto a surface that can rotate about a hinge and is positioned on the intake zone where the air present in the medium surrounding the dryer, enters into the device.

[0008] Document US 4653200A has been identified as the closest prior art. The object of the present invention is the realization of a washer / dryer comprising a filter group which can easily be taken out and cleaned and, which incorporates more than one filters trapping particles at varying sizes present in the medium.

[0009] The washer/dryer designed to fulfill the objective of the present invention is illustrated in the attached figures where:

[0010] Fig.1- is a perspective view of a washer/dryer.

[0011] Fig.2 - is a perspective view of a filter group.

[0012] Fig.3 - is a perspective view of a filter container.

[0013] Fig.4 - is a perspective view of a filter group without a filter inside as the filter container is in its open position.

[0014] Fig.5 - is a perspective view of a filter group as the filter container is in its open position.

[0015] Fig.6 - is a back perspective view of a filter group, behind that placed auxiliary filter.

[0016] Fig.7 - is a back perspective view of a filter group, behind that placed auxiliary filter and protector.

[0017] Fig.8 - is a front perspective view of a filter group, behind that placed auxiliary filter and protector.

[0018] Fig.9 - is an another embodiment perspective view of a filter group that comprising a metal holder.

[0019] Parts shown in figures are numbered as follows:

1. Washer/dryer
2. Filter group
3. Panel
4. Inlet chamber
5. Guide
6. Filter container
7. Lid
8. Frame
9. Filter
10. Bolt
11. Lock housing
12. Detent
13. Handle
14. Auxiliary filter
15. Protector
16. Holder

[0020] The washer / dryer (1) which provides that the laundry placed inside is dried by rotation and by blowing hot air upon them, comprises a body, a washing tank placed inside the body, a drum located inside the said washing tank, a fan used to blow the air, preferably heated by means of a heater, into the drum and, a filter group (2) which is positioned in a housing on the path of the air flow, preferably located at the lower part of the washer / dryer (1) and which may be cleaned by being easily taken

out of the washer / dryer (1) and whereby it is prevented that the fiber, lint and fluff particles etc. in the air inside the drum return to the air cycle, wherein that air is blown onto the laundry placed in the drum by means of the fan (Figure 1 and Figure 2).

[0021] The filter group (2) comprises a panel (3) whereby it is taken out of the dryer (1) by the user by hand and a filter container (6) incorporating an openable / closeable lid (7) and a frame (8) that can be attached to and detached from the mentioned panel (3) and that are fastened to each other by means of a hinge and wherein the air passage is enabled by the cavities located at their center portions and, one or more filters (9) placed at the surface of the frame (8) and / or between the frame (8) and the lid (7), covering the cavities which enable the air flow on the frame (8) and the lid (7) (Figure 5).

[0022] The panel (3) comprises a handle (13) which facilitates the pulling out of the filter group (2) from the washer / dryer (1) by the user, an inlet chamber (4) between the panel (3) and the filter container (6), where the air that proceeds along the drum enters, and a guide (5) with an inclined surface so as the air that passes through the inlet chamber (4) is transferred to the filter container (6).

[0023] The filter container (6) comprises a frame (8) incorporating a lock housing (11), preferably at its upper edge, that is connected to the frame (8) by a hinge and which ensures that the lid (7) does not detach in closed position unless any force is applied and, an openable / closeable lid (7) incorporating a bolt (10) that bends under the application of a force and which is in a form such that it fits to the lock housing (11) connected to the aforementioned frame (8) by a hinge.

[0024] In an alternative embodiment of the present invention, the lock housing (11) may be located at the lid (7) whereas the bolt (10) is located at the frame (8).

[0025] After placing a filter (9) between the filter container (6), the frame (8) and the lid (7), the frame (8) and the lid (7) that are connected to each other by a hinge are moved towards each other and the frame (8) is closed by the lid (7) by fitting the bolt (10) into the lock housing (11). In that case, the filter group (2) is assembled together by mounting the filter container (6) onto the panel (3).

[0026] The filter group (2) comprises a detent (12) located on the panel (3) which triggers a switch as the filter group (2) is taken out of the washer / dryer (1) wherein it is ensured that the washer / dryer (1) does not operate until it is placed back in.

[0027] As the washer / dryer (1) operates, drying process is performed by blowing heated air onto the laundry placed inside the drum. The air that receives the moisture of the laundry by contacting with humid clothes is routed to the filter group (2) in order to return to the air cycle. Moist air that passes through the drum is routed to the filter container (6) via the guide (5) in the filter group (2). The air that reaches the filter container (6) is entered into the air cycle by passing through the filters (9) positioned

at the surface of the frame (8) and inside the filter container (6). Depending on the frequency of operating of the washer / dryer (1), after some period of time, the filters (9) in the filter group (2) are filled with the fiber, lint and fluff particles etc. and restrain the flow of the air. In that case, the filters (9) should be cleaned.

[0028] Following is the description of the cleaning procedure of the filters (9) as being taken out of the washer / dryer (1). The filter group (2) which comprises the panel (3) and the filter container (6) attached to the said panel (3) are pulled out of the washer / dryer (1) by using the handle (13) positioned at the outer surface of the panel (3). The filter container (6) is detached from the panel (3) and the particles on the synthetic filter (9), located at the frame (8), are removed. The sponge filter (9), on the other hand, located inside the filter container (6), between the lid (7) and the frame (8), can be cleaned by being taken out of the filter container (6) as the lid (7) is opened. After the sponge filter (9) is cleaned, it is placed into the filter container (6) and, the frame (8) and the lid (7) are locked together in such a way that the sponge filter (9) is between them. The filter container (6) with the sponge filter (9) inside, is mounted onto the panel (3) and the filter group (2) is attached to the washer / dryer (1). Meanwhile, the detent (12) on the panel (3) which is to trigger the switch inside the washer / dryer (1) prepares the washer / dryer (1) to be ready to use by triggering the mentioned switch.

[0029] As the filter container (6) and the panel (3) may be manufactured in single piece, in the preferred embodiment of the present invention the filter container (6) incorporates the same number of projections / housings as the number of housings / projections on the filter container (6), the frame (8) and the panel (3) wherein the said projections / housings coincide with the said housings / projections in order to attach the filter container (6) to the panel (3).

[0030] In another embodiment of the present invention, in the event that the sponge filter (9) is not placed accurately and properly in the filter container (6) and hence it does not function properly, the washer / dryer (1) comprises an auxiliary filter (14) that is placed downstream of the filter group (2) in the path of the air flow, preferably onto the opening present on the rear wall of the housing through which the filter group (2) is mounted on the washer / dryer (1), and a protector (15) that is placed onto the opening and against which is the auxiliary filter (14) leans, and which prevents damages to the heat source especially the heat pump during mounting/demounting of the auxiliary filter (14). The protector (15) is preferably in the form of a closely woven wire. By using the auxiliary filter (14), it is ensured that the filtering function is carried out, even is the filters (9) in the filter container (6) do not function. Furthermore, the auxiliary filter (14) may be cleaned by the user by being easily taken out of its place (Figure 7, Figure 8 and Figure 9).

[0031] Furthermore, the filter group (2) comprises one or more holder (16) formed at the side edges of the panel (3) so as they fit into the indentations formed at the side

edges of the housing, wherein it is achieved that the said filter group (2) is placed to the housing inside the washer / dryer (1) and does not detach from the mentioned housing unless the user applies a force to do so.

[0032] In the preferred embodiment of the present invention, holder (16) formed at the side edges of the panel (3) is produced of metal, so that it is not negatively influenced by the working conditions in the washer / dryer (1), especially heat. Holder (16), that is produced of metal, is fixed onto the panel (3) preferably by riveting (Figure 9).

[0033] In the dryers (1) with a heat pump, the filter group (2) according to the present invention is placed in front of the heat pump heat exchanger.

[0034] The filter group (2) in accordance with the present invention may easily be taken out of the washer / dryer (1) by the user and may be attached back to the washer / dryer (1) after the filters (9) are cleaned.

Claims

1. A washer / dryer (1) **characterized by** a filter group (2) positioned in a housing on the path of the air flow and may be cleaned by being easily taken out of the washer / dryer (1) and whereby it is prevented that the fiber, lint and fluff particles etc. in the air inside the drum return to the air cycle, comprising, a panel (3) whereby it is taken out of the washer / dryer (1); a filter container (6) incorporating an openable / closeable lid (7) and frame (8), the filter container (6) can be attached to and detached from the mentioned panel (3) and the lid (7) and the frame (8) are fastened to each other by means of a hinge and; one or more filters (9) placed at the surface of the frame (8) and / or between the frame (8) and the lid (7).
2. A washer / dryer (1) as described in Claim 1, **characterized by** a filter group (2) comprising a panel (3) that incorporates, a handle (13) which facilitates is the pulled out of by the user by hand; an inlet chamber (4) where the air that proceeds along the drum enters and; a guide (5) with an inclined surface so as the air that passes through the inlet chamber (4) is transferred to the filter container (6).
3. A washer / dryer (1) as described in Claims 1-2, **characterized by** a filter group (2) comprising a filter container (6) which incorporates a frame (8) the entire surface of which is covered by a filter (9), enabling the air to pass through.
4. A washer / dryer (1) as described in Claims 1-2, **characterized by** a filter group (2) comprising a filter container (6) which incorporates an openable / closeable lid (7) with a cavity at its center portion, enabling the air flow.
5. A washer / dryer (1) as described in Claim 3, **characterized by** a filter group (2) comprising a filter container (6) which incorporates a frame (8) with a lock housing (11) on it.
6. A washer / dryer (1) as described in Claim 4, **characterized by** a filter group (2) comprising a filter container (6) which incorporates a lid (7) with a bolt (10) which is to fit to the afore-mentioned lock housing (11).
7. A washer / dryer (1) as described in any of the above claims, **characterized by** a filter group (2) comprising a filter (9) placed between the frame (8) and the lid (7).
8. A washer / dryer (1) as described in any of the above claims, **characterized by** a panel (3) incorporating a detent (12) that triggers a switch whereby it is ensured that the washer / dryer (1) does not operate until the filter group (2) is placed back to its position.
9. A washer / dryer (1) as described in any of the above claims, **characterized by** a filter group (2) that is placed in front of the heat pump heat exchanger.
10. A washer / dryer (1) as described in any of the above claims, **characterized by** an auxiliary filter (14) that is placed downstream of the filter group (2) in the path of the air flow.
11. A washer / dryer (1) as described in Claim 10, **characterized by** an auxiliary filter (14) that is placed onto the opening present on the rear wall of the housing through which the filter group (2) is mounted.
12. A washer / dryer (1) as described in Claim 10, **characterized by** a protector (15) that is placed downstream of the filter group (2) in the path of the air flow and which prevents damages to the heat source especially the heat pump during mounting/demounting of the auxiliary filter (14).
13. A washer / dryer (1) as described in Claim 12, **characterized by** the protector (15) that is placed onto the opening present on the rear wall of the housing through which the filter group (2) is mounted.
14. A washer / dryer (1) as described in any of the above claims, **characterized by** the filter group (2) comprises one or more holder (16) which is formed at the side edges of the panel (3) so as they fit into the indentations formed at the side edges of the housing, wherein it is achieved that is placed to the housing and does not detach from the housing unless the user applies a force to do so.

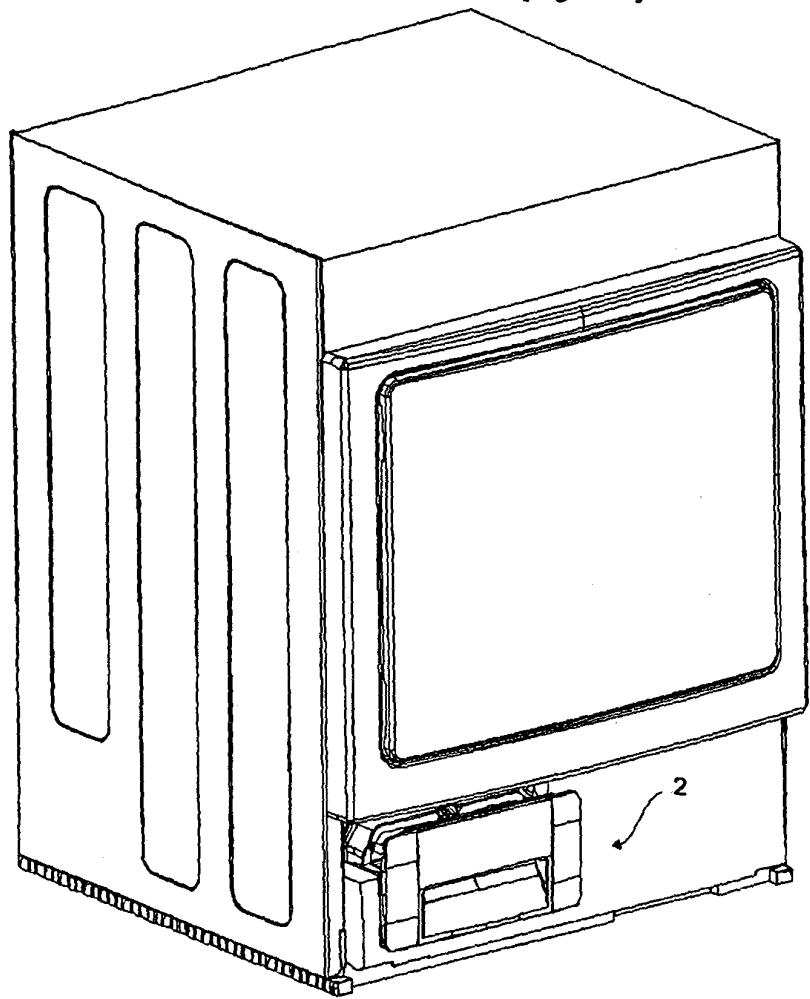
Patentansprüche

1. Wasch-/Trockenmaschine (1), **gekennzeichnet durch** eine Filtergruppe (2), die in einem Gehäuse auf dem Weg des Luftstroms angeordnet ist, und gereinigt werden kann, indem sie leicht aus der Wasch-/Trockenmaschine (1) entnehmbar ist, wobei verhindert wird, dass die Faserpartikel, Staubpartikel und Flusenpartikel usw. in der Luft im Inneren der Trommel zurück in den Luftkreislauf gelangen, umfassend eine Platte (3), mit der sie aus der Wasch-/Trockenmaschine (1) entnommen wird, einen Filterbehälter (6), der einen Deckel (7), der geöffnet und geschlossen werden kann, und einen Rahmen (8) aufweist, wobei der Filterbehälter (6) an der Platte (3) befestigt und wieder davon gelöst werden kann, wobei der Deckel (7) und der Rahmen (8) mit Hilfe eines Scharniers miteinander verbunden sind; und einen oder mehrere Filter (9), die an der Fläche des Rahmens (8) und/oder zwischen dem Rahmen (8) und dem Deckel (7) angeordnet sind. 5
2. Wasch-/Trockenmaschine (1) nach Anspruch 1, **gekennzeichnet durch** eine Filtergruppe (2), die eine Platte (3) umfasst, die einen Griff (13) aufweist, der das manuelle Herausziehen **durch** den Benutzer unterstützt; eine Einlasskammer (4), wodurch die Luft, die sich **durch** die Trommel bewegt, eindringt; und eine Führung (5) mit einer geneigten Fläche, damit die Luft, die **durch** die Einlasskammer (4) strömt, zum Filterbehälter (6) geleitet wird. 10
3. Wasch-/Trockenmaschine (1) nach Anspruch 1 und 2, **gekennzeichnet durch** eine Filtergruppe (2), die einen Filterbehälter (6) umfasst, der einen Rahmen (8) aufweist, dessen gesamte Fläche von einem Filter (9) bedeckt ist, **durch** den die Luft hindurchströmen kann. 15
4. Wasch-/Trockenmaschine (1) nach Anspruch 1 und 2, **gekennzeichnet durch** eine Filtergruppe (2), die einen Filterbehälter (6) umfasst, der einen Deckel (7) aufweist, der geöffnet und geschlossen werden kann, wobei an seinem Mittelabschnitt ein Hohlraum vorgesehen ist, der den Luftstrom zulässt. 20
5. Wasch-/Trockenmaschine (1) nach Anspruch 3, **gekennzeichnet durch** eine Filtergruppe (2), die einen Filterbehälter (6) umfasst, der einen Rahmen (8) mit einem Verriegelungsgehäuse (11) daran aufweist. 25
6. Wasch-/Trockenmaschine (1) nach Anspruch 4, **gekennzeichnet durch** eine Filtergruppe (2), die einen Filterbehälter (6) umfasst, der einen Deckel (7) mit einem Bolzen (10) aufweist, welcher passend zu dem Verriegelungsgehäuse (11) ausgebildet ist. 30
7. Wasch-/Trockenmaschine (1) nach einem der vorstehenden Ansprüche, **gekennzeichnet durch** eine Filtergruppe (2), die einen Filter (9) umfasst, der zwischen dem Rahmen (8) und dem Deckel (7) angeordnet ist. 35
8. Wasch-/Trockenmaschine (1) nach einem der vorstehenden Ansprüche, **gekennzeichnet durch** eine Platte (3), die ein Arretierstück (12) aufweist, das einen Schalter auslöst, wodurch sichergestellt ist, dass die Wasch-/Trockenmaschine (1) nicht arbeitet, bis die Filtergruppe (2) zurück an ihre Position gesetzt wurde. 40
9. Wasch-/Trockenmaschine (1) nach einem der vorstehenden Ansprüche, **gekennzeichnet durch** eine Filtergruppe (2), die vor dem Wärmepumpenwärmetauscher angeordnet ist. 45
10. Wasch-/Trockenmaschine (1) nach einem der vorstehenden Ansprüche, **gekennzeichnet durch** einen Hilfsfilter (14), der stromabwärts zu der Filtergruppe (2) auf dem Weg des Luftstroms angeordnet ist. 50
11. Wasch-/Trockenmaschine (1) nach Anspruch 10, **gekennzeichnet durch** einen Hilfsfilter (14), der an der Öffnung angeordnet ist, die an der Rückwand des Gehäuses vorgesehen ist, **durch** die die Filtergruppe (2) montiert wird. 55
12. Wasch-/Trockenmaschine (1) nach Anspruch 10, **gekennzeichnet durch** ein Schutzelement (15), das stromabwärts zur Filtergruppe (2) auf dem Weg des Luftstroms angeordnet ist, und das eine Beschädigung der Wärmequelle, insbesondere der Wärmepumpe, während des Montierens/Demontierens des Hilfsfilters (14) verhindert.
13. Wasch-/Trockenmaschine (1) nach Anspruch 12, **gekennzeichnet dadurch, dass** das Schutzelement (15) an der Öffnung angeordnet ist, die an der Rückwand des Gehäuses vorgesehen ist, durch die die Filtergruppe (2) montiert wird.
14. Wasch-/Trockenmaschine (1) nach einem der vorstehenden Ansprüche, **gekennzeichnet dadurch, dass** die Filtergruppe (2) ein oder mehrere Halteelemente (16) umfasst, die an den Seitenkanten der Platte (3) ausgebildet sind, derart, dass sie in Vertiefungen einpassbar sind, die an den Seitenkanten des Gehäuses ausgebildet sind, wodurch erreicht wird, dass sie am Gehäuse angeordnet wird, und sich nicht vom Gehäuse löst, es sei denn, dass ein Benutzer eine Kraft ausübt, um dies zu erreichen.

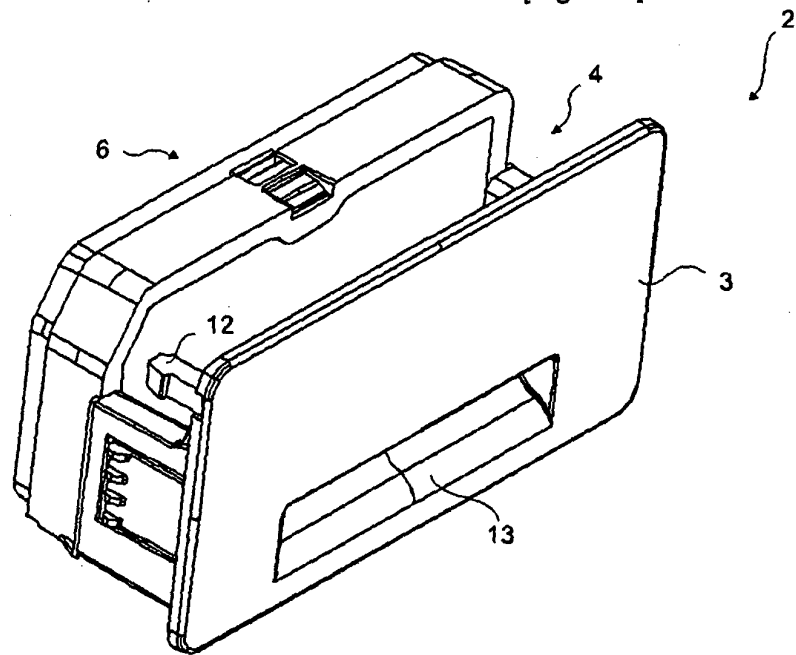
Revendications

1. Machine à laver/sécher (1) **caractérisée par** un groupe de filtre (2) placé dans un logement sur le chemin du courant d'air et pouvant être nettoyé facilement en étant sorti de la machine à laver/sécher (1) et par lequel est empêché l'entrée des particules de fil, de charpie et de touffe, etc. dans la partie en air lorsque le tambour fait tourner le cycle d'air, comprenant un panel (3) par lequel l'air est sorti à l'extérieur de la machine à laver/sécher (1) ; un conteneur de filtre (6) incorporant un couvercle (7) que l'on peut ouvrir et fermer facilement et un encadrement (8), ledit filtre pouvant être attaché ou détaché par ce panel (3), et le couvercle et l'encadrement étant attachés l'un à l'autre par divers moyens d'articulation, et un ou plusieurs filtres (9) placés sur la surface de l'encadrement (8) et/ou entre l'encadrement (8) et le couvercle (7). 5
2. Machine à laver/sécher (1) selon la revendication 1, **caractérisée par** un groupe de filtre (2) comprenant un panel (3) incorporant une poignée (13) que l'utilisateur peut facilement utiliser juste en tirant à la main vers l'extérieur ; un chambre d'anse (4) où l'air tournant dans le tambour entre, et un guide (5) avec une surface inclinée pour permettre à l'air passé dans la chambre d'anse (4) d'être transmis dans le conteneur de filtre (6). 25
3. Machine à laver/sécher (1) selon les revendications 1 et 2, **caractérisée par** un groupe de filtre (2) comprenant un conteneur de filtre (6) incorporant un encadrement (8) dont la surface entière est couverte par un filtre (9), pour assurer le passage de l'air. 35
4. Machine à laver/sécher (1) selon les revendications 1 et 2, **caractérisée par** un groupe de filtre (2) comprenant un conteneur de filtre (6) muni d'un couvercle (7) que l'on peut facilement ouvrir et fermer avec un trou au centre qui assure le passage du courant d'air. 40
5. Machine à laver/sécher (1) selon la revendication 3, **caractérisée par** un groupe de filtre (2) comprenant un conteneur de filtre (6) muni d'un encadrement (8) avec un logement verrouillé (11) dessus. 45
6. Machine à laver/sécher (1) selon la revendication 4, **caractérisée par** un groupe de filtre (2) comprenant un conteneur (6) incorporant un couvercle (7) avec un verrou (10) pour verrouiller ledit logement verrouillé (11). 50
7. Machine à laver/sécher (1) selon l'une des revendications précédentes, **caractérisée par** un groupe de filtre (2) comprenant un filtre (9) placé entre l'encadrement (8) et le couvercle (7). 55
8. Machine à laver/sécher (1) selon l'une des revendications précédentes, **caractérisée par** un panel (3) incorporant un cliquet (12) qui déclenche un interrupteur par lequel la machine à laver/sécher (1) s'arrête jusqu'à ce que le groupe de filtre (2) soit passé à sa position initiale. 5
9. Machine à laver/sécher (1) selon l'une des revendications précédentes, **caractérisée par** un groupe de filtre (2) placé sur le front devant de la pompe de chaleur de l'échangeur de chaleur. 10
10. Machine à laver/sécher (1) selon l'une des revendications précédentes, **caractérisée par** un filtre auxiliaire (14) placé en aval du groupe de filtre (2) sur le chemin du courant d'air. 15
11. Machine à laver/sécher (1) selon la revendication 10, **caractérisée par** un filtre auxiliaire (14) placé sur l'ouverture présente sur le mur arrière du logement sur lequel le groupe de filtre (2) est monté. 20
12. Machine à laver/sécher (1) selon la revendication 10, **caractérisée par** un protecteur (15) placé en aval du groupe de filtre (2) sur le chemin du courant d'air et empêchant ainsi les dommages pouvant être causés notamment par la pompe de chaleur sur la source de chaleur durant le montage/démontage du filtre auxiliaire (14). 25
13. Machine à laver/sécher (1) selon la revendication 10, **caractérisée par** un protecteur (15) placé sur l'ouverture présente sur le mur arrière du logement sur lequel le groupe de filtre (2) est monté. 35
14. Machine à laver/sécher (1) selon l'une des revendications précédentes, **caractérisée par** un groupe de filtre (2) comprenant un ou plusieurs détenteurs (16) placés sur les coins de côté du panel (3) pour être fixés dans les indentations placées sur les coins de côté du logement, par lequel l'emplacement du logement est assuré de façon à ce qu'il se détache pas du logement à moins que l'utilisateur le fasse par force. 40

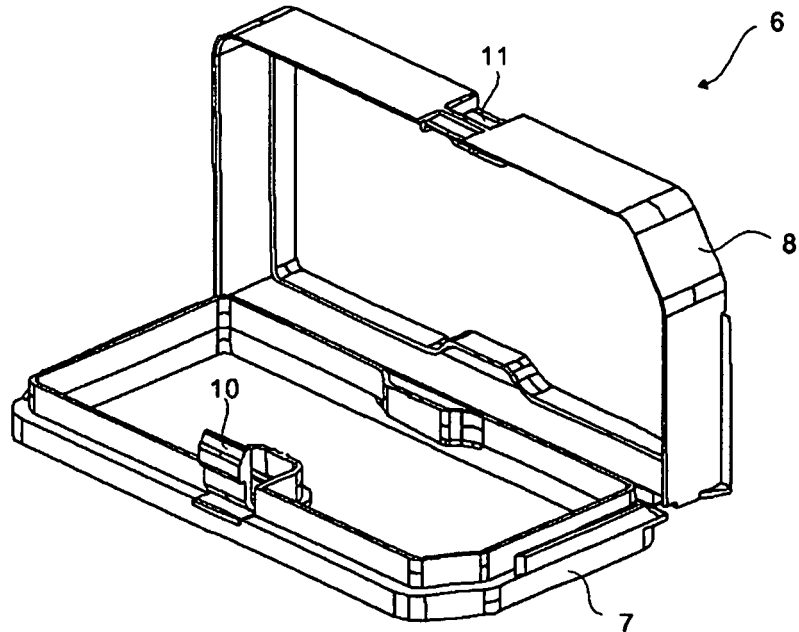
[Fig. 001]



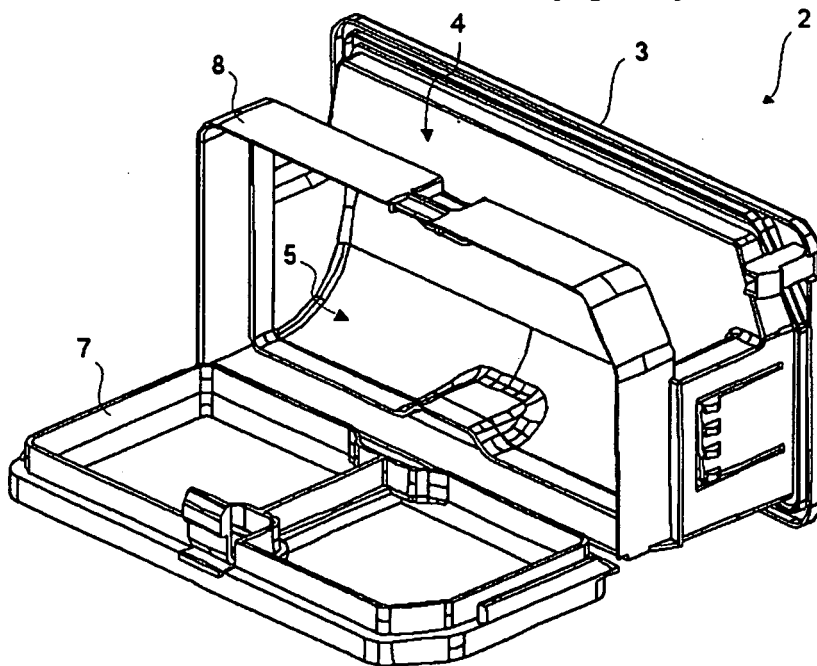
[Fig. 002]



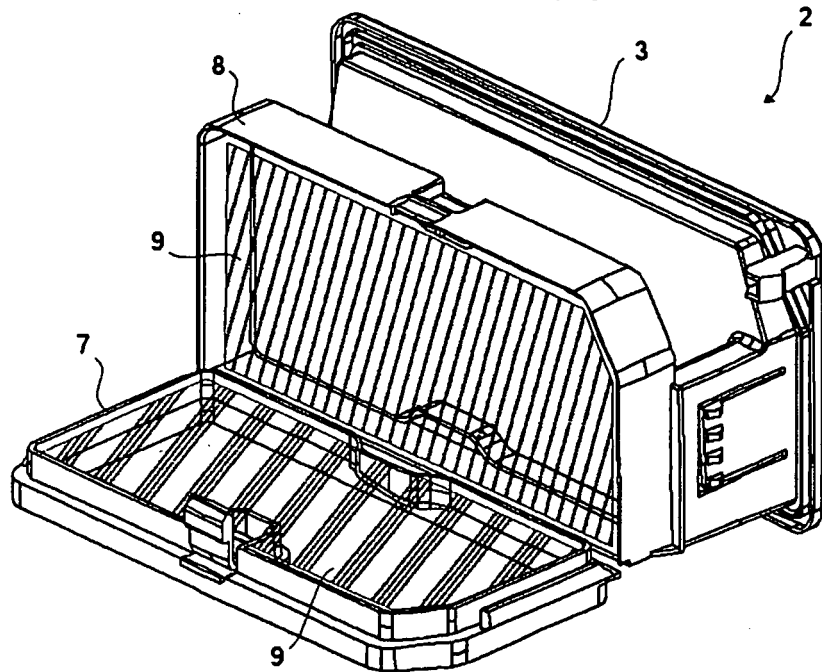
[Fig. 003]



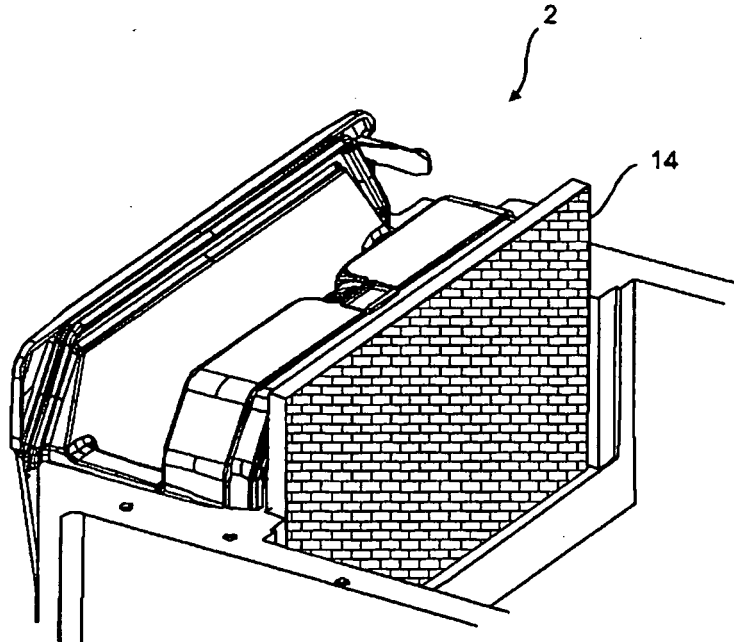
[Fig. 004]

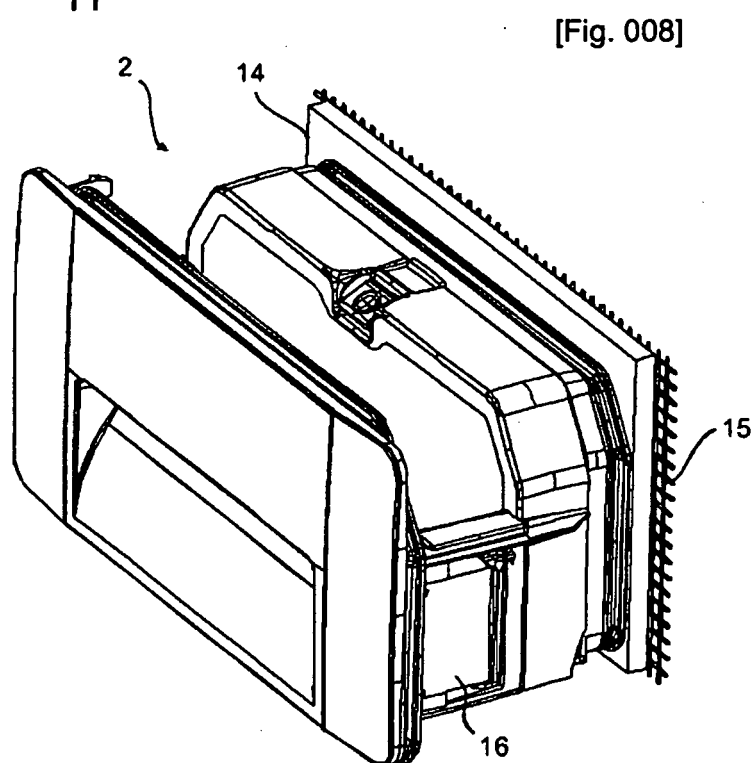
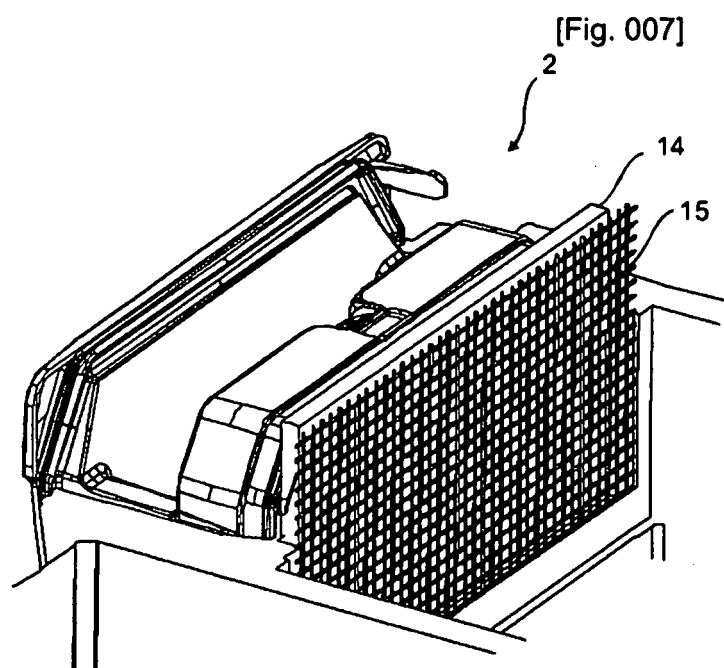


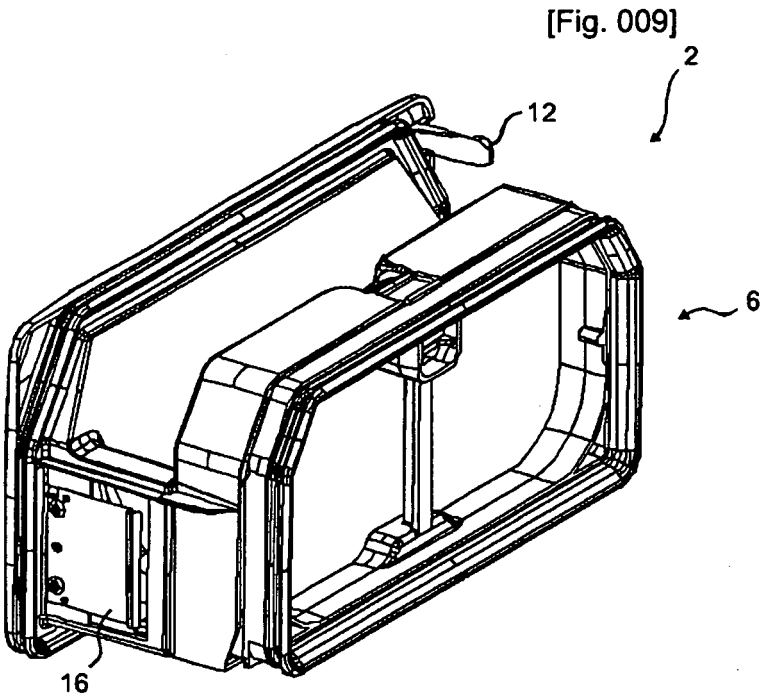
[Fig. 005]



[Fig. 006]







REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 3748746 A [0004]
- GB 2091123 A [0005]
- US 5651188 A [0006]
- EP 1022373 A [0007]
- US 4653200 A [0008]